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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/560,793

12/15/2005

Xiangsheng Meng

CGL03/0043US01

7410

38550 7590 02/05/2007
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EXAMINER

KATAKAM, SUDHAKAR

ART UNIT

PAPER NUMBER

1621

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

02/05/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/560,793

Applicant(s)

MENG ET AL.

Examiner

Sudhakar Katakam

Art Unit

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/15/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The examiner has considered applicant's Information Disclosure Statement of 12/15/2005. Please refer to the signed copies of the PTO-1449 forms attached herewith.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Badische Anilin- & Soda-Fabrik AG** (GB 1,167,793).

Instant claims are drawn to a process for separating and recovering 3-hydroxypropionic acid from aqueous solution comprising 3-hydroxypropionic acid and acrylic acid, comprising extracting the aqueous solution with organic extractant other than ethyl acetate, to extract the acrylic acid from the aqueous solution into the organic phase, and the resulted organic phase is heated in presence of water to distill off the organic solvent, thereby forming an aqueous acrylic acid solution.

Badische Anilin- & Soda-Fabrik AG teach a process to separate acrylic acid, in which the solvent has a higher partition coefficient than solvents which have hitherto been proposed, in which the acrylic acid is separated practically quantitatively in a few extraction stages, in which the solvent need not be distilled, in which the boiling point of the solvent is higher than the boiling point of acrylic acid, in which the addition of a salt to the aqueous phase is not necessary and in which the main impurities, i.e., propionic acid and acetic acid, can be easily separated [col.1, lines 65-74 & col.2, lines 1-3]. The extraction of (meth)acrylic acid from vaporous mixtures is also carried out in conventional mixtures, e.g. by contacting the vapors with the solvent countercurrently [col.3, lines 6-9]. The solvent used for the process is lactam, but it also teaches the use of mixtures of solvents such as aliphatic, cycloalipatic or aromatic hydrocarbons, halohydrocarbons, ethers or esters [col.2, lines 95-102].

The difference between the instant invention and **Badische Anilin- & Soda-Fabrik AG** is that in the instant the separation of 3-hydroxypropionic acid from 3-hydroxypropionic acid and acrylic acid mixture, whereas the reference teaches the purification of acrylic acid from the impurities which consists of propionic acid.

The propionic acid and 3-hydroxypropionic acid differs from each other by a $-OH$ group. Acrylic acid and 3-hydroxypropionic acid have the known partition coefficients of 0.35 and -0.89 (given as $\log P$ octanol/water, as found in customary handbooks). Therefore, 3-hydroxypropionic acid is known to be about 17 times more water-soluble than acrylic acid. The skilled artisan facing the problem to separate both acids present in a single aqueous solution would contemplate extracting the less water soluble, i.e. acrylic acid with an organic solvent. The use of a low boiling extractant is obvious for reasons of ease of recovery of acrylic acid, either as solid or as an aqueous solution.

Please note the separation of organic acids from less water-soluble compounds is obvious in the art. The removal of the organic solvent by distillation for displacing the compound to be extracted into water is a routine measure for the skilled artisan, especially when the said compound has a non-negligible solubility in the said organic solvent.

In view of explicit teachings of **Badische Anilin- & Soda-Fabrik AG** and from the known separation methods in the art based on the compound physical properties, the examiner purports that it would have been obvious to a person of ordinary skill in the

art, at the time of invention was made, to have modified the reference teachings in separation of 3-hydroxypropionic acid and acrylic acid, with a reasonable expectation of success.

Modifying such methodology is a prima facie obvious because an ordinary artisan would be motivated to use known purification methods to make the process more efficient or explore economical advantages over the other, since it is within the scope to optimize the conditions through routine experimentation.

Conclusion

5. No claim is allowed.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sudhakar Katakam whose telephone number is 571-272-9929. The examiner can normally be reached on M-F 8:30 AM - 5:00 PM.

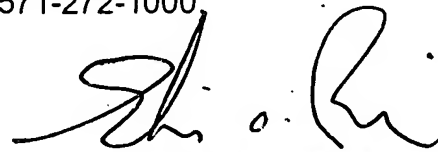
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thurman Page can be reached on 571-272-0602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

Art Unit: 1621

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

S. Katakam



ELVIS Q. PRICE, PH.D.
PRIMARY EXAMINER